ing over the middle plateau. The other part apparently moved northward and occupied the north Pacific coast until the morning of the 30th, attended by snow and gales in Washington and Oregon. The evening report of the 30th showed a trough of low pressure extending from the north Pacific coast to the middle Rocky Mountain region. On that date a disturbance appeared on the middle California coast, heavy rain prevailed in California, heavy snow fell in areas from the north Pacific coast over the middle plateau, destructive windstorms were reported in Utah, and west to northwest gales occurred on the Washington coast.

By the morning of the 31st this low area had been divided by an area of high barometer (number XI) which extended rapidly southeastward over the eastern Rocky Mountain slope. One part, XVI, occupied eastern Nebraska and the other, XVI*a*, was central over Colorado. By the evening report of the 31st XVI had advanced to Lake Superior, and XVI*a* remained over Colorado. On that date rain fell in the Ohio and middle Mississippi valleys and the southern lake region, a heavy snowstorm prevailed in Minnesota and parts of Iowa, and snow was followed by clearing weather, high westerly winds, and intense cold in the Northwest.

NORTH ATLANTIC STORMS FOR JANUARY, 1893.

[*Pressure in inches and millimeters; wind-force by Beaufort scale.*]

The paths of storms that appeared over the west part of the north Atlantic Ocean during January, 1893, are shown on Chart I. These paths have been determined from reports of observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

The normal distribution of pressure over the north Atlantic Ocean for January shows highest pressure in a small area situated about midway between the Azores and the Windward Islands, where the values are above 30.20 (767). A belt of high pressure, with readings above 30.10 (764), stretches from the eastern part of the ocean between the 20th and 40th parallels to the coast of the United States south of the 41st parallel. The normal pressure is lowest in an elongated area extending from southern Greenland over Spitzbergen, where it is below 29.50 (749).

In January there is usually an increase of pressure over the southern part of the north Atlantic Ocean, the greatest increase, about .05 inch, appearing in an area southwest of the Azores. Over the northern part of the ocean there is a decrease of pressure. The storms of January generally advance from the Canadian Maritime Provinces towards the Iceland area of low pressure. The storms of this month have an average velocity of about 22 statute miles per hour, and an average of about 2.5 storms per month traverse the ocean from the American to the European coasts.

Generally fine weather prevailed in the vicinity of the British Isles during January, 1893. In the first decade a storm apparently moved eastward over the Bay of Biscay, and from the 24th to the close of the month the pressure continued low west of Ireland. Over mid-ocean and thence to the American coast the month was marked by storms of exceptional severity. Three storms were traced from American to European waters.

Two storms of marked strength occupied the north Atlantic at the opening of the month. One of the storms was central southwest of Ireland, with pressure below 29.30 (744), the other was located southwest of the Azores, where the barometer fell to about 29.40 (747). The afternoon and evening of the 1st westerly gales prevailed along the middle and south Atlantic coasts, attending the passage of low area I over the lower lake region. During the 2d the pressure continued low west of the British Isles, and a severe storm moved northeastward over the Azores. Low area I passed northeastward over the lower Saint Lawrence valley and the north part of the Gulf of Saint Lawrence, and hard westerly gales continued along the Atlantic coast.

Reports of the 3d indicate that the storm central west of the British Isles on the 1st and 2d united with the storm which advanced from the Azores. On that date hard gales and pressure below 29.30 (744) were reported between the 20th and 30th meridians and south of the 50th parallel, and the pressure continued low over the Gulf of Saint Lawrence. During the 4th the pressure continued low over mid-ocean and the Gulf of Saint Lawrence.

On the 5th low area III advanced off the middle Atlantic coast, with pressure about 29.40 (747), and the pressure continued low between the 20th and 30th meridians. During the 6th low area III moved northeastward to a point south of Cape Breton Island, with pressure below 29.00 (736), and west to northwest gales of force 10 to 11 were encountered between the 55th and 65th meridians. The pressure continued low southwest of the British Isles. The morning of the 7th low area III was central south of Newfoundland, with pressure about 29.15 (740), and the storm over the eastern part of the ocean had increased in energy and shifted position to a point southwest of Ireland.

During the 8th low area III advanced to mid-ocean, and the pressure was about 29.30 (744) south of Ireland. By the 9th low area III had advanced to a position north of the Azores, with central pressure below 29.40 (747), the storm which had occupied the ocean southwest and south of the British Isles from the 6th to the 8th had moved eastward over the Bay of Biscay, and a storm area covered Newfoundland and the Grand Banks. By the morning of the 10th low area III had apparently moved eastward over the Bay of Biscay, a storm from the Grand Banks had moved northeastward north of the 50th parallel, low area V had advanced off the New England coast, with pressure below 29.10 (739), and westerly gales of force 9 to 11 were reported west of the 60th meridian. During the 10th low area V recurved northward to the lower Saint Lawrence valley and passed thence northeast of Newfoundland by the 12th, attended by strong gales over and near the Grand Banks.

During the 12th low area VI passed south of east off the New England coast, with pressure about 29.30 (744) and northwest to west gales of force 10. Moving northeastward, with gales of force 9 to 11, low area VI reached a position east of Cape Breton Island the morning of the 13th, and disappeared north of Newfoundland during the 14th. On the 15th low area VII moved northeastward off the New England and Nova Scotia coasts, and a storm appeared south of the Azores. During the 16th low area VII disappeared north of Newfoundland, and the storm south of the Azores increased in energy. During the 17th and 18th the storm near the Azores shifted position to the west and northwest, and by the 19th had apparently reached Newfoundland, attended by northwest gales of force 7 to 10 west of the 60th meridian.

The morning of the 19th low area IX passed off the south Atlantic coast, attended by severe gales south of Hatteras. During the 20th low area IX moved northeastward to the Grand Banks, with northwest gales of force 9 to 10 off the Atlantic coast, and passed northeast of Newfoundland by the

morning of the 21st. This storm occupied mid-ocean in high latitudes during the 22d and 23d, and passed north of the British Isles during the 24th.

The night of the 25th low area XIII moved eastward over Nova Scotia and the morning of the 26th was central south of Newfoundland. Passing thence northeast to a position north of the Grand Banks by the morning of the 27th, attended by northwest gales of force 10 to 11, this storm moved thence rapidly eastward and united with a storm which appeared over mid-ocean on the 26th. On the 29th the pressure fell below 29.00 (736) over mid-ocean; by the 30th the storm had advanced to about the 20th meridian, and during the 31st apparently passed north of the British Isles.

OCEAN ICE.

The first Arctic ice reported since October, 1892, and the first ice reported south of the 50th parallel since August, 1892, was a large berg noted in N. 47° 35′, W. 48° 34′ on the 5th. On the 8th a long, low berg was observed in N. 48° 10′, W. 47° 26′. On the 18th a berg was noted in N. 48°, W. 46°. In January, 1892 and 1889, no ice was reported. In January, 1891, three large icebergs were observed in N. 46° 30′, W. 52° 46′ on the 28th, and on the 31st patches of soft ice were encountered in N. 45° 50′, W. 59° 20′. In 1890 vast fields of ice and enormous icebergs were encountered over and near the Grand Banks north of the 43d parallel. In January, 1882 to 1888, inclusive, Arctic ice in small quantities was reported east of Newfoundland, but in no case was it sighted south of the 43d parallel.

The positions of icebergs reported for the current month are shown on Chart I by ruled shading. Ice encountered along the Atlantic coast and in the rivers, bays, and harbors of the United States is noted under "Inland Navigation."

OCEAN FOG.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on eight dates; between the 55th and 65th meridians on one date; and west of the 65th meridian on six dates. Compared with the corresponding month of the last five years the dates of occurrence of fog east of the 55th meridian numbered 1 more than the average; between the 55th and 65th meridians 8 less than the average; and west of the 65th meridian the same as the average. The dense fog noted by shipmasters and reported at stations of the Weather Bureau on the middle Atlantic and New England coasts generally attended the advance or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for January, 1893, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over extreme southern Florida, and at stations in the Colorado Desert, California, where it was above 60. The mean temperature was above 50 in Florida south of the 30th parallel, along the Gulf coast west of the Mississippi River, in eastern Texas south of the 31st parallel, and generally in California south of the 35th parallel. North of a line traced from the South Carolina coast westward to northwest Texas and southern New Mexico, thence northwestward over southern Nevada, and thence along the Sierra Nevada and Coast Ranges of mountains to northwest Oregon the mean values were above 40.

The mean temperature was lowest in Manitoba, where it was —5 to —10. The mean readings were below zero in northern Ontario, the northern half of Minnesota, and eastern North Dakota, and were below 10 in northern New England, northern New York, over the northern lake region, along the Mississippi River from Davenport, Iowa, northward, and north of a line traced from near Davenport to northeastern Montana. North of a line traced from the south New England coast to southern Illinois and central Missouri, and thence to extreme northwest Montana, and in areas in the middle and northern Rocky Mountain and plateau regions the mean temperature was below 20.

YEARS OF HIGHEST MEAN TEMPERATURE FOR JANUARY.

At Fort Reno, Okla., Fort Supply, Ind. T., Eureka Ranch, Kans., Deming and Santa Fe, N. Mex., Las Animas and Denver, Colo., Cheyenne and Fort Washakie, Wyo., Fort Robinson, Nebr., Fort Mohave and Whipple Barracks, Ariz., San Diego, Los Angeles, Riverside, and Keeler, Cal., and Fort Townsend, Wash., the mean temperature for the current month was the highest noted during the respective periods of observation.

In the 22 years preceding 1893 the highest mean temperature for January occurred from the north Pacific coast to western Minnesota in 1891; along the Atlantic and east Gulf coasts and on the southeast slope of the Rocky Mountains in 1890; over the middle and northern plateau regions in 1887; and from the Alleghany Mountains over the Ohio and Mississippi valleys, the Lake region, the middle-eastern slope of the Rocky Mountains, and the west Gulf coast in 1880.

YEARS OF LOWEST MEAN TEMPERATURE FOR JANUARY.

At Woods Holl and Nantucket, Mass., Block Island, R. I., New London and New Haven, Conn., New York, Plattsburg Barracks, Rochester, and Buffalo, N. Y., Atlantic City, N. J., Philadelphia, Pittsburg, Erie, Dyberry, Grampian, and Wellsboro, Pa., Baltimore and Cumberland, Md., Washington, D. C., Norfolk and Lynchburg, Va., Raleigh, Charlotte, Hatteras, Kittyhawk, Wilmington, Southport, and Lenoir, N. C., Statesburg, S. C., Augusta and Savannah, Ga., Jacksonville, Fla., Louisville, Ky., Parkersburg, W. Va., Cincinnati, Columbus, Cleveland, and Toledo, Ohio, Indianapolis and Lafayette, Ind., Springfield and Chicago, Ill., and Davenport and Dubuque, Iowa, the mean temperature for the current month was the lowest noted for January during the respective periods of observation.

In the 22 years preceding 1893 the lowest mean temperature for January was noted from the California coast over Nevada and eastern Oregon in 1890; on the New England coast and in an elongated area extending from the north Pacific coast to Lake Michigan in 1888; from the southeast slope of the Rocky Mountains and eastern Kansas to the south Atlantic coast in 1886; and on the middle-eastern slope of the Rocky Mountains in 1875.

DEPARTURE FROM NORMAL TEMPERATURE.

The mean temperature was below the normal east of a line traced from the Red River of the North to the lower Missis-